

THE COMPARATIVE DESIRABILITY OF THE FORMAL OR IRREGULAR TREATMENT OF STREET ARCHITECTURE IN LARGE CITIES.

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"A Street is a broad and maine way for horsemen and footmen to passe, and where great store of passengers walk and travyle to and froe, especially in a citie or town." — NORDEN, *Speculum* (A.D. 1723).

THE quality of desirableness is rather an abstract matter of opinion than an absolute matter of fact. *Désir de Dieu et désir de l'homme sont deux*, and between man and man there is an ever-fluctuating value for a standard desirability. Further, when we come to a question of comparison, a man and his neighbour seldom see eye to eye alike, so that for the purpose of discussion the point of view is almost everything.

The man in the house and the man in the street approach the subject of street architecture from different and mutually exclusive standpoints, with the result that diametrically opposite conclusions are reached in each case. The man in the house, commencing with Bacon's comfortable postulate that "houses are made to live in and not to look on," builds upon this half-truth a formidable-looking argument; while the man in the street knows well enough that he for his part is accustomed to live in one house and to look on a thousand. Immediately there is disagreement. But there is yet a third man, the man who lives on the other side of the way, a good fellow who is not too exclusive; perhaps he can direct us to the truth about desirability.

This good citizen rises in the morning and draws his blind up on the prospect of the twenty houses opposite, goes through streets and squares about his avocations, and in the evening returns through streets and squares to draw his chair up to a peaceful hearth and to reflect that outside, in the great city, are houses, houses, houses, while here, inside, is the one house which he calls "home." This man will take down from its shelf his copy of Bacon's "Essay on Building," and will make a marginal note that "in large cities, houses are made partly to live in and partly to look on"; he will gather, from his own experience, that a fit street architecture must develop her highest qualities for the convenience and wellbeing of her citizens, for the comeliness and glory of her cities. *Usui civium decori urbium*, the motto of the Royal Institute, is the standard by which we shall endeavour to compare the desirabilities of the formal and the irregular treatment of street architecture in large cities.

Having therefore determined the point of view, let us proceed to ascertain what, in this assay of comparative desirability, is to be the meaning of the words "formal" and "irregular," and, seeing that buildings are somewhat cumbrous things and, when we are dealing with streets of them, awkward to delineate, let us illustrate our meaning in the first instance by symbols. Let it be granted that the sequence (a) 72, 54, 36, 18, 9, 27, 45, 63, 81, is formal,

while the group (*b*) 9, 36, 81, 72, 18, 45, 27, 54, 63, is irregular. Here, evidently, the principal difference between group (*a*) and group (*b*) is a difference of arrangement. If we examine (*b*) we shall see that each member of the group is related to every other member, each one belonging to the family of 3, and the group is therefore in that respect "formal," yet the want of arrangement of the parts makes the whole "irregular." If, on the other hand, we consider the sequence (*a*), we notice that each number, besides being related by family ties to every other number, has in addition its own individual place in the family group. This would be an example of elaborate formality. Now take a third group (*c*), 71, 54, 36, 18, 7, 27, 45, 63, 82. Here we have a sequence, a descending and ascending scale, but the intimate relation of each member to every other member is lost: three stranger numbers who belong not to the family of 3² have intruded, and, though the group (*c*) is still formal, yet it is less formal than group (*a*). Lastly (*d*), .99999 . . . , or .9, exemplifies a very usual, not to say commonplace, kind of formality. There are no two ways about irregularity, but formality has its grades, from the dreary procession of milestones along the high road to the elaborate evolutions of the dance.

"Mystical dance, which yonder starry sphere
Of planets, and of fixed, in all her wheels
Resembles nearest, mazes intricate,
Eccentric, interwolved, yet regular
Then most, when most irregular they seem.
And in their motions harmony divine
So smoothes her charming tones, that God's own ear
Listens delighted."

Hitherto we have purposely been dealing only with symbols, but if we apply our observations to street architecture we shall perceive that it is the relation, or want of relation, of house to house which characterises the formal or irregular treatment.

Moreover, we shall recognise degrees of formality varying from the rows of undistinguishable houses planted along rigid lines, as though fashioned and marshalled by an unreasoning machine, to the more elaborate formality which, while impressing on each unit its distinctive character, will yet compel each to take its one appointed place in the greater scheme of the street. Irregularity, like that of the symbol-group (*b*), will result from the collection in one street of many houses, each perhaps with an aspect of formal cut, irrespective of the congruity of each to the whole. It would be easy to build an irregular street of a number of houses, each designed in strict accordance with the rules of some old master; and therefore, for the remainder of this essay, the words "formal" and "irregular" will not be applied to the treatment of the component part, to the architecture of the one house, but will always refer to the whole resultant treatment—to the street architecture properly so called.

To the irregular treatment the possession of an almost unchallenged mastery of street architecture is at once both an advantage and a disadvantage. For whereas irregularity can point to some undoubtedly good achievements—as, for example, Princes Street, Edinburgh, or the High Street, Oxford—and can claim consideration on the score of its real practical vitality from a practical people who are not given to regard change as a consummation devoutly to be wished; yet we, in England at any rate, see around us good, bad, and indifferent examples of the irregular treatment, and are apt to judge the whole parcel by the worst sample, while the formal treatment, never having been fairly exploited, is continually calling us to observe more closely the advantages it holds out to those pioneers who will boldly venture to the promised land. The ideal formal city is inhabited at present only in our dreams, and we awake to find ourselves in a real old irregular city, irregular, but good enough, we say, for this passing workaday world. Let us then proceed, stage by stage, to examine the respective

claims of irregularity and formality, fairly considering and comparing them at their ideal best and at their real worst.

The present irregular treatment of street architecture claims for its method a common fundamental basis with that of natural law. The need of the individual finds its own expression in each street front. Let us by all means have beauty in our street architecture, but let that beauty be the natural result of a logical elaboration of use. The *ducus urbium* should be the outcome of the *usus civium*. Thus it is that Nature, the great architect, works. "For," says Coleridge, "the organic form is innate. It shapes, as it develops, itself from within, and the fulness of its development is one and the same with the perfection of its outward form. Such as the life is, such is the form. Nature, the prime, genial artist inexhaustible in diverse powers, is equally inexhaustible in forms; each exterior is the physiognomy of the being within." Possessing not only a complete appreciation of the need of the individual citizen, but also a highly developed sense of what is beautiful, the architect, with ever fertile, vitalising power, brings the utilitarian and aesthetic elements of building to a union of which is born the perfectly consistent and therefore perfectly beautiful fabric. In such a system you will have here one citizen, with his own peculiar need adequately met and beautifully expressed, and there a neighbour citizen with his own different need adequately met and beautifully expressed. "Each exterior is the physiognomy of the being within." The men are neighbours, their dwellings are side by side in a great city—two beautiful buildings, beautifully irregular. The convention which is called formality finds here no admiration, for here we recognise only the beauty of truthfulness.

But at this point the Formalists intervene with an objection which may be stated as follows. Assuming for the moment that the exterior of each house does perfectly interpret its internal economy, so that, like the organic form, "it shapes itself from within," can we be certain that the inside of the houses constitutes the "within," the true inwardness of street architecture? Are not "within" and "without" relative terms? Surely for the man in the street the outside of the street lies beyond the walls that flank the street on all sides. Outside the street is, in fact, inside the houses; and therefore, as regards street architecture, the man in the house is the "outsider" and the man in the street is the "being within." The problem for the architect is, indeed, no less than to meet the individual need of his client inside the house: but it is a great deal more, because when he builds in a city the architect numbers among his clients the "horsemen and footmen" and the "great store of passengers" who "walk and traveyle to and froe." It is this "great store of passengers" who give to the streets and to street architecture their *raison d'être*. For imagine that the street passenger, by the perfecting either of underground tubes or of aerial motors, were to become extinct. Our streets would dwindle until they became only areas for light and air, problems of street architecture would cease to interest anybody, and architects would concern themselves with tube architecture or bird's-eye architecture. The street passenger is in much the same position with regard to the street wall dividing him from the man in the house as an adjoining owner with regard to the party-wall. In the latter case the Law recognises rights of joint ownership, and in the former case street passengers might fairly claim to exercise certain rights over a moiety, at least, of the wall which flanks the street. If their claim were admitted, the overwhelming suffrage of the street folk would impose an architecture conforming truly *usui vicium*. Irregularity would be confined to the insides of houses. Then would street architecture be formal; and not till then would architects be able to say of their town buildings, "Such as the life is, such is the form."

Let us now see what answer the champions of the *status quo* can make to the above argument. Irregularity altogether disclaims a mere disorderly desire to break rules. It is

only some of your arbitrary laws of proportion or of alignment, of balance or of repetition, the disregard of which has brought upon ordered adaptability to use the unjust title of "irregular." Rules of economy and convenience, which have had their influence on legislation, have also had their influence on irregularity, so that the present irregular treatment of street architecture neither is nor tends to be absolute. For example, in the matter of frontage line, the usual form of this is a straight line, because, in the first place, the private owner desires to build on his land right up to the boundary of the public thoroughfare; secondly, convenience—the convenience of the man in the street, whom irregularity is said to neglect—convenience reminds us that the straight line is the shortest way if we would go from here to there: and, thirdly, legislation steps in and prescribes exactly how near the public thoroughfare the building line may be drawn. Economy, convenience, and legislation—the same three—are at work, though not in so marked a degree, on the sky-line. The private owner desires to pile his materials high on a costly plot of ground: the inconvenience of smoky chimneys due to a towering neighbour is one of the considerations that give pause to the owner whose fancy is the house on one or two floors: and again, legislation, with a beneficent *lur fiait*, prescribes for certain widths of streets certain maximum front-wall heights beyond which the ambition, or folly, of the building owner may not soar. These, then, are instances of irregularity recognising the greatest good of the greatest number and submitting to become regular. But irregularity stops short of the injustice, of the falseness which formality uses so unshamedly.

One has seen on new buildings, or on buildings in course of erection, those notices which inform the passer-by that "alterations can be made to suit the convenience of intending tenants." Now formalism would just reverse the process, and the tenant would be asked to twist and squeeze his convenience to fit the stereotyped front-wall arrangement which has been inspired and completed without reference to the functional element in the building. The butcher, the baker, and the candlestick-maker will be constrained each to hide his butchery, his bakery, and his candlestick factory behind an indifferently formal eighteen-inch thickness of front wall; a front wall which has ceased to be a physiognomy and has become instead a mask. Wherefore the formal treatment is guilty not only of injustice to the man in the house, who is become a bondsman and not free, but also of falseness to the man in the street, who forthwith comes to regard architecture as hypocritical, and trusts only the glaring sign with its announcement that, although Mr. So-and-so inhabits behind a Palladian drop-scene of masonry, he is in fact Purveyor of this or that to the Court and Royal Family. Is architecture the mother of the arts, and does she descend to take an ignoble place behind the immature art of the poster?

Now one sees in this charge of injustice and falseness yet another attempt to make formalism appear hostile to the truthfulness which undoubtedly characterises the works of Nature. But whereas Nature is never finite, but ever takes count of mutability of use; in the philosophy of those who proclaim the naturalness of irregularity this mutability finds no place. We build in the course of two years a fabric which is designed to last for two centuries, and the architect cannot, like the "genial artist" Nature, put into his structure cells which, hidden at first, shape, develop, and come to fulfilment just when they are needed. The child of the architect's brain is born into the world either with a complete set of teeth, from "canines" to "wisdoms," or with no teeth at all and no provision for a dental system. If mere "use" is to be the natural basis of the outward form, then either "use" should remain unchanged for the life of the building, or the architect must take into account and make provision for all the sum totals of conceivable uses during a course of, say, two hundred years. What will be the good of putting up a most expressive bakery front, a front which shall have "Bakery" archi-

tecturally written all over it, if at the end of seven, fourteen, or twenty-one years your baker is going to move out and an oilman is going to move in? The record of the logical basis of your bit of street architecture will be locked up somewhere in a tin-box along with deeds and other legal documents. You must either pull your bakery down, or allow it to continue to tell untruths about the occupation of the oilman inside, and of his successors who are not bakers, for an unconscionable time.

Now the logical escape from the dilemma is this, that in the ideal irregular city the fabric should perish with its use, but it is doubtful whether the citizen is prepared to accept so fragile a return for his money. This was not the ideal of the old Greek colonists of Agrigentum, "who built as though they were to live for ever and feasted as though they were to die on the morrow," and there are many men who like to think that we should have some such ideal now, in spite of the cynics who say that we have already lost the Greek spirit past all hope, and that we have found in steel a material sufficiently perishable to ensure a short life for our buildings. There is indeed a good deal to be said in favour of an ephemeral architecture for an ephemeral use; we prefer that the scenery should change as the actors leave the scene, and it is not exhilarating to find, as one not infrequently does in Italian cities to-day, the cloistered walks of a monastery trodden no longer by the patient feet of studious monks, but echoing to the regulation tramp of the Government custodian who presides over a turnstile and an umbrella stand.

It is, no doubt, true that this mutability of use will affect all street architecture whether irregular or formal, but the latter is not affected to nearly so great an extent as the former, because while irregularity bases itself on a temporary "use," formality finds its basis in a more permanent "tendency of use." For while uses are often variable, tendencies are for the most part uniform. In the abstract the measurement of "tendency" will be difficult, but, in the concrete instance, accurate observation will generally lead to a correct estimate of tendency. For example, the limits of "club-land" in London are well-defined; physicians prefer Harley Street and its environment: picture-dealers congregate on the west side of Bond Street; in Cockspur Street shipping agencies abound, and Long Acre is colonised by carriage-builders. The expression by our street architecture of tendency of use will generally lead to a formal treatment; and, provided the tendency has been rightly gauged, there is no reason why use-tendency should not endure with the buildings that are its complement.

Moreover, there is another powerful factor whose influence on architecture, if allowed free scope, would conduce to a formal treatment; this other factor is street character. For streets do undoubtedly possess character, and street architecture at present does not lend much assistance, if any, to the expression of that character. If, however, anyone should doubt the existence, apart from architecture, of street character, let him walk some afternoon from the Marble Arch in an easterly direction along Oxford Street. Let him take notice of the people he meets, of the shop-windows, of the whole "life" in the street. Let him turn southward down Bond Street: he will, as he proceeds, notice that he has made more than a mere turn to the right; he will find himself in a different "atmosphere," as we say; the sauntering crowd, the shop windows furnished with fewer and more select articles, all these are different. Again, when he turns westward into Piccadilly, and yet again, when he turns southward into St. James's Street, his environment alters; so that when at last he goes eastward along "the sweet shady side of Pall Mall" he might be in another city than that which he traversed along Oxford Street. One who is familiar with the streets of a large town will recognise a difference between the character of one side of a street and the other; tradesmen allege that there are few streets which have not their "best" side of the way, and the character of a long street varies even in the course of its length. Now, street character is largely influenced by

the "user" of the street; but street architecture has not hitherto submitted to this influence, and has remained in consequence irregular. If the architecture of St. James's Street were to take on some of the character of the "Court of St. James," and Harley Street architecture were different again, but expressive of Harley Street character, what an interesting formality would result! How is it that architects neglect to express street character in their work? Is not the answer to this question to be found in the attitude of mind which induces the designer to regard his piece of frontage between two party-walls as a unit complete in itself, instead of, what it really is, a part of the street, which street again is a part of a great city, and has its particular function in that city? In short, these artificial party-walls are allowed to slice up our streets into pieces, of widths varying from fifteen feet to fifty, and consequently a great city like London can be described, in the words of Horace Walpole, as "a gigantic mass of littleness."

But the detractors of the formal treatment have still a goodly list of objections to urge; they are not enthusiastic about the expression of street use or street character; nay, they even suggest that the formal expression of these may not only be ludicrous and vulgar, but also dull and meaningless. The following is somewhat the line of argument they bring forward to support this part of their case: St. James's Street has been mentioned as an example of a street with a character. Now at the north-west corner of that street there stands a club-house shouldering a coach-builder's shop; the group is irregular in its architectural treatment, and rightly so, because the wide expanse of plate-glass that is required for the display of the carriages is manifestly unsuitable for the windows of the club-house, which are large enough to light the rooms and allow a pleasant view of the street, but not so large as to admit of the "vulgar" reading the member's newspaper or studying his breakfast *menu*. Here there can be no give-and-take in the matter of architectural treatment without the introduction of a strong suspicion of ludicrousness or even vulgarity, as when, in the harlequinade, the clown emerges from the policeman's uniform, or when on Hampstead Heath the Bank Holiday lads and lasses exchange hats. Moreover, for downright dulness give us the undistinguished undistinguishable rows of arcaded shops such as one meets in Turin, and compare with these the picturesque irregular streets of Florence, in those parts where the formal mania is not sweeping away old markets and crooked ways and substituting great gaunt piazze. And, after all, when you have expressed your meaning in a formal manner, will not your production often square with the poetry of those rhymesters who "make the one verse for the other's sake"? Of course, your few great poets will not do so, but the smaller fry, the rank and file of poetasters, who have nothing in particular to say, will produce their "volumes of verse."

"In mossy prankt dells that the sunbeams flatter
(And Heaven it knoweth what that may mean;
Meaning, however, is no great matter)
Where woods are a-tremble with rifts betwixen."

We do not say that architects under the present system always produce sense, but let the public pause before pledging itself to a system which will certainly lead to whole streets of dull and valueless architectural nonsense.

But formalism has an answer to these objections. Street tendency, it is urged, shows an inclination on the part of carriage-builders to settle in one street, while club-men prefer another, and formal street architecture, by accelerating this tendency, would encourage the erection of carriage-builders' premises in Long Acre and of club-houses in St. James's Street. Perhaps the most difficult problem for the architect who would desire his street design to be formal is the frequent recurrence of the public-house at street corners: but this remarkable

isolation of a particular class of house really serves to accentuate and make more apparent the normal tendency of street use towards congruity. Moreover, it is doubtful whether in the formal city public-house architecture would be in a class by itself; for there does not appear to be any tangible reason why the architectural expression of the shop where a man drinks draught beer from its native pewter should not approximate to the architectural expression of the shop where he drinks milk from a cup or glass. There will probably be in the ideal formal city a few refreshment streets in which busy men will, during the luncheon hour, contentedly contemplate the formality of refreshment-street architecture.

As regards the analogy from literature which has been advanced to show that a great deal of sorry stuff finds its way into rhyme, and is miscalled "poetry," there is sufficient truth in Calverley's final "reflection," for words are indeed piled on words, and stones on stones, and we are invited to compare our orders, balustrades, architraves, and all the familiar stock-in-trade of the formal builder, with the "brave rhymes of an elder day," and we are further asked to believe that if we could abolish these there would be less architecture (of a sort) in our cities, and our buildings would mean a good deal more. But, on the other hand, does not the ordeal imposed on the writer by a difficult metre rather make for a well-shaped and agreeable rendering of his theme? Are not some of man's most beautiful thoughts enshrined in that form which is, perhaps, the most rigid, the most exacting in any language, the form of the sonnet? The gains of restraint to the artist have been celebrated by Wordsworth in an exquisite example—

"Nuns fret not at their convent's narrow room.
And hermits are contented with their cells,
And students with their pensive citadels :
Maids at the wheel, the weaver at his loom,
Sit blithe and happy ; bees that soar for bloom
High as the highest peak of Furness fells,
Will murmur by the hour in foxglove bells :
In truth the prison, unto which we doom
Ourselves, no prison is : and hence for me
In sundry moods, 'twas pastime to be bound
Within the sonnet's scanty plot of ground ;
Pleased if some souls (for such there needs must be)
Who have felt the weight of too much liberty,
Should find brief solace there, as I have found."

What architect has not experienced "the weight of too much liberty," what mastery is required to avoid spoiling the *carte blanche*? and, on the other hand, what unsuspected niceties of plan have been developed from some morose angularity of site or some uncompromising refractoriness of conditions of lighting or of respect for neighbours' rights? Instead of taking the sheet of paper, blank but for the centre lines—neatly dotted on—of the flanking party walls, the architect will hedge his design about with conditions of street use and street character, and while evolving his idea will always bear in mind the larger street and the still larger city to which this little fragment is to be complementary. The party-wall will take its proper place as a common possession, quite private, quite "between themselves," of adjoining owners, who will not glory in proclaiming their disagreements, but, as good citizens, will hide their little differences and show with their neighbours a united front to the world.

The quality of unity, which we recognise as the essential attribute of all great work, whether of poet or statesman, dramatist or painter, is never fortuitous, but is the true child of formality. If we are to have unity in our street architecture we must look for it in the formal treatment, because irregularity can only produce it by becoming formal. The conformity of each component element to a central complex idea cannot be apart from formality.

Irregularity is like the invitation "to drop in" on one's host "and take pot-luck"—often admittedly a very pleasant exercise—but, for pure enjoyment, not to be compared with the set entertainment provided by a clever hostess who never, in the selection and arrangement either of the *menu* or her guests, loses sight of the fact that the giving of a dinner is a formal, if difficult, art. There are some who go so far as to deny that the casual irregular collection of any buildings in any street can rightly be called street architecture at all, any more than an armed mob constitutes an army. But this severely exclusive view is only mentioned here to emphasise the importance that undoubtedly does attach to the quality of unity.

A cogent objection to the introduction of unity of treatment in street architecture may be found in the consequent necessity for some sort of censorship to regulate street design and compel conformity to the desired manner. It is argued that whether your censor be an individual, ruthlessly dispensing for his term of service an official code, or a board of taste with an authoritative mission from the electorate, the result of state or municipal interference with design will be nothing else than

"Art made tongue-tied by authority
And folly doctor-like controlling skill."

But from the architect's point of view it is questionable whether a censorship, however arbitrary, inelastic, and obstructive, might not be a better taskmaster than the "taste," often quite untrained, of the individual owner. For, search where you will, there is now no answer to the ultimate argument that he who pays the piper has a right to call the tune, unless it is to be found in the establishment of a censor-arbitrator who shall see that if the piper's art and the payer's right are sometimes in conflict, at least the harmony of street architecture shall never suffer.

The success of the London County Council's project for a formal treatment of the new Holborn to the Strand thoroughfare is to be desired, but the activity of the Council in this matter begins where the subject of this essay ends. The difficult problem for the Council and its advisers has been not to decide whether a formal or irregular treatment is the better, but to contrive a means to get a good formal treatment well carried out. For the purpose of this essay, the choice by a great municipal body of a formal treatment is the only relevant matter. If, on the one hand, the practicability of the scheme be proved by the issue, the advocates of formality will have a further witness for their contention; but, on the other hand, if the undertaking should unfortunately end in failure, the formalists may still argue that either the instructions to the architects or the machinery for carrying through the enterprise was at fault, and that the impracticability of the formal treatment is yet to be proved.

At this point we may revert to a desirability belonging to the irregular treatment which has been alluded to in an earlier part of this essay, namely, its undeniable practicability.

In a country where we are not ashamed to admit that things usually muddle through in the end, a policy of *laissez faire* is the popular policy. Provided the building owner does not unduly inconvenience his neighbour or endanger the public safety, he is allowed to do pretty much as he likes, and when the work is done, we make the best of it. This is a quick and easy way, and it is a way that has ruined and will ruin many a good scheme. Sir Christopher Wren, the most heroic figure among British architects, saw his plan for rebuilding the City after the Fire deliberately neglected and irrevocably spoilt, because men were in so great a hurry to get roofs over their heads that they gave themselves no time to consider the great Surveyor's scheme, though "there was," as John Evelyn wrote, "never a more glorious phoenix upon earth, if it do at last emerge out of these cinders." That which City builders failed to do in 1666, when both the occasion and the man were there to help them, City

builders are failing to do in the present year of grace, when neither the opportunity nor the directing mind is so obvious. And the consequence is that the "phœnix" that is daily rising from the ashes of a city's destruction is a kaleidoscopic collection of heterogeneous buildings arranged, for the most part, in rows which we, being above all things a practical people, are accustomed to call "street architecture." The irregular treatment is, however, alive and in possession, and there will have to be a great deal more "education of the public" before it will consent to be ousted on purely "art" grounds.

Thus it will be seen that besides the unsympathetic attitude of the man in the street, the building owner has to meet a more searching, a more far-seeing criticism from the master of architecture, "who," as Sir C. Wren says, "thinks his judges, as well those that are to live five centuries after him, as those of his own time." To provide a working compromise between the apparently conflicting interests of the one builder, his many neighbours, and the great host of citizens yet unborn: this is the mission of a fit street architecture, and this is the mission that the formal treatment claims to fulfil. That quality of good citizenship to which the Romans gave the name *urbanitas*; that attribute of Christian neighbourliness which asks only "room to deny ourselves," will find expression in an urban architecture that is formal and therefore really "civil." "Manners maketh man," but what does the manner of our street architecture as it is tell us of the ideals of the men who inhabit our towns? Because a building owner is a millionaire, he is allowed to put up a front very rich in ornament to outshine the plainly-dressed appearance of the rest of the street; ordinary civility would here suggest the formal treatment of the street front and the relegation of lavishness to the inside of the house, where it will afford pleasure to the owner without putting the poorer neighbour in the shade or spoiling the congruous aspect of the street. Furthermore, there is the degrading method which seems to prostitute architecture to the uses of advertisement. Either it is the architect himself who seeks to attract notice and clients by a noisy, conspicuous design, or it is the tradesman—and in this respect the "publican" is often a sinner—who, if he may not have a flash-light on his roof, is determined that the wayfarer shall not pass unreminded of the particular "line" which "at this establishment is unrivalled." A formal street architecture discourages selfishness and advertisement, but glories in urbanity.

Moreover, street architecture, influenced by use tendency and character tendency, and becoming formal in the process, will in its turn react as an educating, humanising power on the lives and modes of thought of the dwellers in the cities. When, at the recent Congress of Architects, the education of the public in architecture was discussed, most speakers were agreed that only the architects can, by their works, improve the public appreciation of their art. The ordinary man, to do him justice, does give architects credit for putting some meaning into their works. But in irregular streets he sees these experts busily contradicting one another; therefore he is fain to abandon interpretation. Either the consideration of architecture occupies a very remote place in the system of his mental activities, or he comes to regard architectural matters as not intended for his concern at all; and thus the seed of a positive incapacity for criticism or appreciation is sown and cultivated. In the formal city, however, street use and street character will be writ so clearly on the street buildings that he who runs will read. Architecture, more intimately connected with civil life, will become at once more interesting, and therefore more educating. The services of the popular lecturer, with his neatly labelled lantern slides, teaching "architectural styles" to amateurs, will in the formal city no longer be required. There will be no amateurs. Every man will have learnt from his surroundings that for him architectural style is a living reality. He will be quick to notice, not so much differences of "Gothic" and "Classie," of "Christian" and

"Pagan" architecture—of these he will have read something in books—but incongruities, vulgarities, and sins against "style" in architecture, these he will mark down—nay, will hunt down and expel from the city, along with street noises of every sort.

And what of us architects? Are we going to wait for the Government to give us a censor to reign over us for the repression of architectural viciousness? Rather let us unite to put our house in order for ourselves. Let our students at the Royal Academy and at the Royal Institute—in every place where we train the builders of our cities—let our students be encouraged to cultivate urbanity in street architecture, by competitions for the most congruous design for a definite site in a city, by "restorations" which shall embody the existing work of some past master and weld it into one great street conception, and by fostering as far as possible appreciation of any and every good quality in the work of others. Neither in the schools nor at public exhibitions should a design for a fragment of street architecture be countenanced unless accompanied by a sketch of the whole scheme to which the detailed front is complementary. The practising architect, with a sense of *esprit de corps* making him jealous for the good name of the brother who has been at work before him, will endeavour to carry on the idea of the original designer, or, if not, to create a better scheme embodying the existing work in the completed street. The irregular treatment is indeed practical; but can the ideal of such professional conduct as would in time make the architectural treatment of our streets a formal one—can such an ideal never be realised? Maybe much of this is mere speculation, an empty dreaming which can never lead to practical results. Nevertheless, speculation is not always in vain, and one may wake from dreams with truer inspirations for nobler efforts. With all our thoughts concentrated on the many pressing insistent problems connected with the housing of multitudes in great cities, we shall work to no less good purpose by reason of those visionary intervals wherein we allow ourselves to range far on ahead in the utmost fields of speculation.

Two lovely children run an endless race,
A sister and a brother;
That far outstripped the other;
Yet ever runs she with reverted face,
And looks and listens for the boy behind
For he, alas! is blind!
O'er rough and smooth with even step he passed,
And knows not whether he be first or last.—COLERIDGE: *Time, Real and Imaginary*

We do not know, we cannot tell, whether the ideal formal city can ever be; but a great step towards the union of the real and the ideal will have been taken when we architects are agreed as to what is our ideal in this matter of the treatment of street architecture.

In this essay we have examined the comparative desirability of the formal or irregular treatment from the wide-seeing standpoint, *Usui cirium decori urbium*; we have shown that "use," developing itself along certain definite lines or tendencies, would justify a more congruous street architecture than now obtains. We have analysed the principal arguments that are commonly used on either side. One aspect of the matter yet remains, and it is this: that whereas noise and restlessness accompany irregularity, the formal treatment brings in her train peacefulness and repose.

With the best intentions, an architect is prone to seek to convey all his meaning in the one piece of street front which is given him as a medium for expression. Perhaps, like von Moltke who was often "silent in seven languages," the architect with a whole street at his disposal might allow himself at least one brilliant flash of unbroken wall space, masterful and overwhelming with the deliberate impressiveness of a great man's silence. Now, in the

irregular treatment of street architecture this awe-inspiring dumbness of the dead wall seldom asserts itself, for fear lest the unsympathetic interjection of the next-door front may put on golden silence the brand of brute dulness. The formal treatment, however, offers the architect freedom from the necessity of saying in small compass all that he means. Formality, too, exhibits in the highest degree the powerfulness of contrast. Contrast, which some mistake for a phase of irregularity, is really one of the chief attributes of unity. In that Formal City which exists, we believe, somewhere, the imagination is stimulated, the eye is led down the long vista of the narrowing street to where, on the farther side of the great piazza, the heaven-suspended dome looms delicately-shaded above a rainbow veil of sunlit fountains.

THE USE AND ABUSE OF PERSPECTIVE.

By MAURICE B. ADAMS [F.]

MRAFFLES DAVISON'S success as an architectural artist has been so complete that no apology on his part was needed in contributing the most interesting article on the subject of architectural perspective which appeared in the JOURNAL R.I.B.A. of the 26th of last month. No one, of late years certainly, has done more by example to advance the art of pictorial draughtsmanship among architects than Mr. Davison, and there can be no doubt that many of the foremost members of the profession owe him no small thanks for the artistic and capable manner in which he has from time to time rendered their designs for competition and exhibition purposes. The personal element of this appreciation of Mr. Davison's craftsmanship would to some extent be lacking in individuality if I omitted to mention that it has been my good fortune to meet him on very many occasions at the Royal Academy and elsewhere on press views, whereat a pleasurable interchange of critical opinions and ideas on the works exhibited has enabled me to realise how thoroughly Mr. Davison appreciates and justly estimates the designs of contemporary architects, loyalty and reserve always being conspicuous on these interviews in respect to work with which his own drawing has been associated. This capacity has enabled him invariably to display a marked discrimination in setting out and finishing his perspectives, with the result that he usually manages to present the subjects entrusted to him in the most advantageous light, gracefully moderating a feature here or emphasising a detail there, to the great gain of the composition so depicted.

Anything, therefore, which Mr. Davison has to say about the use of perspective drawing will necessarily command close attention, and particularly so among those who have had experience of a special kind in draughtsmanship themselves. For my own part I may say that the article on

perspective with which Mr. Davison has enriched the pages of the Institute JOURNAL appears to me most admirable, even if I venture to differ from some of his conclusions. I can scarcely believe that any true architect really undervalues the relative utility of perspective as an aid in design. As a matter of common knowledge, the most capable architectural designers in modern times have, with rare exceptions, been the most accomplished draughtsmen. The late William Butterfield was, perhaps, a brilliant exception, and he personally explained to me his ideas of perspective, and considered it wanting because, as he said, it emphasised too much one given point of view, whereas in looking at a building the spectator continually altered his point of sight in walking round it. Kaleidoscopic perspective remains, however, beyond the powers of the ordinary delineator, so that this objection of Butterfield's to single views can only be overcome by producing several perspectives; and that, in the ordinary way, is of course out of the question.

Mr. Davison tells us that there exists a growing feeling among architects against perspectives, and adds that the depreciatory criticism in respect to architectural drawing as an art in itself, which one frequently hears nowadays, is only a sign of the times. This may be so; but if some architects taboo perspectives, as he says they do, is this not due to the fact that such drawings more than often are so adroitly manipulated and so adjusted by the adept draughtsman that the perspectives, instead of being accurate records, become misleading, while in some cases they actually falsify both the proportions and character of the buildings they are supposed to represent? Of course, Mr. Davison would say that such a condition of affairs only establishes the misuse of the art of perspective; and no doubt there remains much truth in his argument that "things which look well enough in elevation have a trick of turning up very queerly in perspective." There is another side to the question, notwithstanding. Very few possibly have had so vast a number of architectural drawings of all kinds pass through their hands as I have during the past twenty-nine years, since I

came to London; and with this experience I think I may say that it is by no means certain that the ordinary, everyday, clever, and fetchling perspective does actually tend to refine or in any material degree enhance the merit of contemporary design in the way claimed for it. The drawing, indeed, for that matter, may be correctly set up, strictly in accordance with the rules of perspective—every detail may be shown in a way devoid of chicanery; but unless the draughtsman himself has a keen sense of the proportion of things, and is able to modify and adapt the point of sight best suited to his subject, the result, all the same, is most likely to be misleading and unsatisfactory.

As a means to an end, architecturally speaking, good honest drawing cannot possibly be overestimated; but at the same time it is well constantly to remember that perspective drawing was entirely unknown when most of the masterpieces of mediæval architecture, for example, were erected. Of course, we can no more revive mediæval methods of working than we can recall to life the men who practised them. It must be admitted that exquisite design has been executed, and no doubt is still produced, without the aid of beautiful drawings, and consequently in that sense the importance of perspective can readily be over-esteemed. Wretched designs may be made to pass muster by capable draughtsmanship, and it may be acknowledged that fine designs seldom suffer at the hands of a really artistic draughtsman. However we view draughtsmanship, it is clear that to produce good buildings worthy of the name of architecture, their designer must possess the creative faculty, enabling him to evolve his conception by an intuitive sense of shape and form, or the result must be ordinary and commonplace, whether he is possessed of a facile pencil or not, and he will, by the very conditions of his art, think in perspective. His first studies, however, must assume geometrical shapes and measured sizes, augmented, as his sketches no doubt should be, by perspective notes. These latter are essentially different, however, in scope and intention from the show pictures of the specialist, such as Mr. Davison has accustomed us to. I remember calling, many years ago, on an architect friend, well known at that time for his powerfully clever pen-and-ink drawings, just as he was making a study of this kind for a church tower and spire. After exchanging greetings, I proceeded to sit upon a high-backed office stool standing in the centre of the room, when, much to my surprise, my friend excitedly jumped up, exclaiming, "For Heaven's sake, man, don't shift that stool, for I was using the back of it as my vanishing-point!" For the purpose in hand, I suppose, he found such a contrivance "near enough"; but surely that was only because he really knew what he was about. Technically correct perspective in his case was a minor con-

sideration. Apart from his architectural sense of fitness, he was quite as likely to have been wrong, and without his power of design, as it is called, a correctly projected point of sight would have been of little avail.

The corrective use of linear perspective no one can gainsay, but at most it can only serve as a test in verification of the architect's exercise of mental perspective, or to bring into position some incidental feature which otherwise might be overlooked. A model, beyond question, would, I suggest, be far more useful in this respect; and it becomes a question in "the workshop of hope" for the future, indicated by Mr. Aston Webb, A.R.A., in his speech at the last general meeting of the Institute, whether architects would not do better by discarding perspectives more, and making their designs as far as possible "in the round," and thus, by modelling their works more than heretofore, escape to some extent from the trammels of precedent, and perchance be enabled to develop a twentieth-century style. Whatever such a departure may be like, it seems more than probable that sculpture of the nobler sort must become an intrinsic element in the architecture of the future, and modelling would greatly help in the attainment of that end. At the present time I notice with regret the fashion of drawing as if anything would do by way of a perspective, provided the effect obtained is peculiar; or, on the other hand, infinite care is taken to produce a weird conventionality of delineation, chiefly distinguished by niggling Noah's Ark-like trees or shrubs and telegraph-wire skies. The last novelty in this direction which I have noticed was shown by one of the competitors this year for the Soane Medallion. He traversed his sky with thin white horizontal streaks, about a full sixteenth of an inch wide, enclosed in each case by lines, and then filled in the intervening spaces with flat laminated washes of differing grey tints like the building, the windows remaining light. Another method in vogue is to colour a perspective with washes merging one into the other, adopting a sloppy, daubish mannerism in impossible tones, with the sole idea, seemingly, of producing something unlike anything in this world or the next! This result doubtless looks striking, and obtains attention by dint of being "up to date."

It has been the fashion for some little while to speak slightly of the drawings of the past masters of the Gothic revival period, and to sneer at the somewhat hard and possibly matter-of-fact perspectives of a quarter of a century ago; but it is doubtful whether we have yet reached such a stage of perfection, either in design or drawing, that we are justified in assuming these airs and graces. The more we realise that perspectives are at best architectural diagrams, the better for good building—and that, after all, should be the aim of the architect.

SOME PRINCIPLES COMMON TO ALL BUILDING MATERIALS.

Lecture to the Students of the Northern Architectural Association, given at Newcastle-upon-Tyne on 16th January 1901.

By FRANK CAWS [F.], Vice-President N.A.A.

THE thought which I wish to carry as a continuous thread through my discourse tonight is that the behaviour of materials, and their sufferings under stress and strain, are so similar to our own that, as we closely study them, it becomes evident that these materials, though not "bone of our bone, and flesh of our flesh," share with us in those elemental principles common to all creation, and are, in a very real and no merely fanciful degree, *our fellow creatures!* So you will pardon me if I occasionally allude to the "human nature of building materials." This thought should make them less uninteresting than if we regard them as mere dead matter.

"A merciful man is merciful to his beast." But if the man be ignorant of the natural requirements of his beast, his "mercy" may be so ill-judged as to give his beast too little or too much and irregular exercise, shortening its life all ways. Anticipating my impending analogy, you may object that an architect cannot shorten the life of any piece of material in his building by giving it *too little to do*, though he may break it by demanding of it *too much*.

Without pushing the analogy too far, I will mention a case in point—a real and quite modern case, familiar enough to the architects and builders of Newcastle. I allude to the collapse of the "Eldon Arms," whereby—though luckily no one was killed or injured—£10,000 worth of building property was irretrievably wrecked. Having been professionally consulted, by one of the deeply interested parties, as to the cause of this extraordinary disaster, I studied the ruins systematically and closely, and found that four columns in the basement had to sustain the combined loads of floors and internal partitions, &c., such as were not carried by the outer walls. I found that originally these columns were called on to bear approximately equal loads. But after the building was opened for business, and after the architect had completed his work and been paid for it, some other person—not an architect, I believe—removed a partition wall, and inserted a beam on an upper floor in such a way that one of the four metal columns of the basement was compelled to bear severe and awkwardly-adjusted extra stress which the remaining three columns were not permitted to share. What was the consequence? The overloaded column broke first, and the other three followed suit immediately.

Assuming that there was a certain irreducible amount of total stress to be borne by these four columns, the overstressing of one and the under-

stressing of the others were inevitable concomitants. So it would be as true to blame the understressing of the three as the overstressing of the fourth for the disaster. It is noteworthy that the total load originally imposed on these four columns, which before the alteration they endured for many months, and which they would probably, had the alteration not been made, have continued to endure, was a *greater* total load than they had to carry after the alteration. But though the unfortunate alteration lessened the total load, it so changed its *incidence* as to give one column an unfair stress, thus precipitating the ruin not of that one only, but of the three others also, and thereby wrecked the whole structure.

If some people were invited to name the four personal pillars of our British State to-day, they would reply Salisbury, Balfour, Hicks-Beach, and Chamberlain. Whether you and I agree with them or not, we may, for argument's sake, allow their selection to pass unchallenged, and employ it to illustrate our subject still more vividly than the four broken columns of the "Eldon Arms." Now if one of these four men were to break down in administering his special department, his failure would probably render politically consequent the fall of the other three, so that the whole Government would be wrecked by the collapse of one of its main supports.

These illustrations thus far show how other members of a Government, or of a structure, may be ruined by the failure of one member; but a further truth should not herein be overlooked, viz. that if one *part* of an individual member is weak, that little local failing may bring about the ruin of the entire fabric to which it belongs.

We all know that weakness in the *head* of one of the four statesmen I have named might at the present juncture of our national affairs involve our country in misfortune or loss. And those who are acquainted with the details of the "Eldon Arms" disaster know it was due to weakness in the *heads* of the four columns. Each column cap had a square abacus, and was of neat design of a simple Norman character. Not the external design of the architect, but the internal design of the foundry foreman was at fault. These four capitals were very large, and were cast like hollow boxes, somewhat funnel-shaped. They ought to have had internal stiffening webs to carry the line of shaft straight up to the cover, as indicated by dotted lines in fig. 1. But there were no stiffening webs, and the leverage afforded to the load by the overhang of the cap enabled the load to crush the

caps as though they had been egg-shells. The upper part of each cap broke down, falling in fragments to the floor, leaving the shafts of the columns standing, with the stumps of their caps broken off at F, to bear the superincumbent

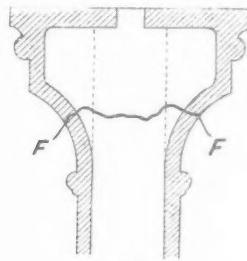


FIG. I.

girders, which settled down upon them and rested, sustaining still the weights of the more or less disorganised floors and partitions of the superstructure. These columns, with their fractured remnants of capitals, would doubtless have continued to stand, bearing those heavy loads, till now, had not their removal been necessary to the rebuilding of the entire structure, which the disorganisation of walls and floors, &c., rendered imperative. They stood for many weeks after the accident without betraying any further weakness. Indeed, the columns, had their heads been as strong as their shafts, would have carried probably about eight times the load imposed on them before showing any weakness.

These details are a little wide of the subject of "Principles common to all building materials"; but, seeing that most of you will be repeatedly called on to design metal columns and their caps, I could not, merely for the sake of keeping my remarks strictly within the immediate scope of the subject, pass over this "Eldon Arms" disaster without warning you against allowing metal founders to leave out the stiffening webs necessary to keep hollow caps from crushing; for one such example as that of the "Eldon Arms" should prove sufficient for us, if only we will take warning.

Small structural defects may ruin noble edifices, as "little foxes spoil the choice vines." "The strength of the chain is its weakest link." The strength of the working man may be estimated by the rate of his output, year in, year out. A man may kill himself by overpowering himself, i.e. by turning out his work at a rate which he cannot maintain. To increase his strength of the present moment, he may overdraw on his physical reserves, thereby exhausting his stock of vitality and undermining his constitution. The rate of work which costs a man his life is the measure of the breaking strength of that man.

If by employing forced labour we had killed

one thousand men, and then measured the total amount of work each man had done, and divided it by the time he took over it, we might from such data of a thousand cases arrive at the average and maximum and minimum breaking strength of a man. And we might say, "Now we have done of killing men. We will work no more to death. Henceforth we will adopt 3 as a factor of safety—that is to say, we will impose on each man only one-third the amount of work per day that would kill him."

"Yes," says someone, "that is all very well. But look what a wide range of difference there is between the maximum and minimum strength of your one thousand broken men! Which are you going to steer by—maximum, minimum, or average?" "Oh," we reply, "average, of course." But our interlocutor is not satisfied. He asks, "Why of course? Had you not better take the minimum? Remember, 'the strength of the chain is its weakest link.'"

"Oh, yes, true," we reply; "but if we are going to adopt the minimum as our rule we cannot afford to allow a factor of safety so large as 3. There is foreign competition to contend with, and our clients will not pay more than they think fit for the structures they want. However, we can perhaps meet your views if we adopt a method of proof strength."

"Proof strength," says Interlocutor, "what is that?" We explain to him that we propose before permanently engaging a man to set him a proof task, to test his working capacity and strength: just an hour's work. And he asks, "But how much work in the hour will you give him to do as a test?" We reply, "Only work requiring half the breaking strength of the average man of our thousand. If he does that job, then we will engage him, and permanently work him, not at half but at one-third the average man's breaking strength."

But Interlocutor is still dissatisfied with our explanations and proposals. He asks awkward further questions, such as the following, which we cannot answer—"How do you know that this man on whom you impose the proof task is not below the average strength? May he not by overstraining himself in doing the proof task render himself less able to work continuously at the lighter permanent task, which, but for your overstraining him by your proof test, he might have done without overtasking his powers? Is it not highly probable that the initial overstrain in such a case would escape your notice, and, indeed, that the man might himself be unaware of it till afterwards? Are not undetected overstrains often the more dangerous because their development is so insidious that when eventually discovered it is too late to repair?"

The foregoing *argumentum ad hominem* fairly exemplifies modern methods of determining the

amount of load, or of duty, which a given member of a structure will stand.

You see there are the breaking strength (say, =3), proof strength (say, =1½), and working strength (say, =1). These factors—3, 1½, 1—are usually employed for *static* loads. For rolling and dynamic loads, also for compressive loads acting longitudinally through members, such as columns and struts, whose length greatly exceeds their transverse dimensions, much higher factors of safety than 3 are recognised as imperatively necessary.

These factors are somewhat empirically chosen to guard against overstress, whether tensional or compressional.

Now what is overstress or overtension?

Some of us know too well what it is in the case of a *man*. It is stress beyond strength. But overtension by no means involves immediate breakdown. It makes excessive overdrafts on the needful reserves of strength, thus causing permanent injury.

This general recognition of the nature of overtension is not precise enough, however, to serve the practical requirements of the architect.

A principle or property, common to all materials in the universe, presents itself to our notice at this stage, and demands our most earnest attention. I mean **ELASTICITY**. Many persons confound elasticity with *stretchability* (to coin a word), or, more properly speaking, *extensibility*. But that is a mistake which no architect should permit himself to make.

A piece of material of definite normal length and diameter under a given tension may stretch an inch, while another material of equal normal length and diameter under equal tension may stretch a yard. In popular parlance the latter would be considered much the more elastic of the two. But that is the most elastic material which, when the stretching force is discontinued, discharges the highest percentage of its stretch, and returns most nearly to its normal length. Thus, for example, if the material which stretched 1 inch discharged $\frac{63}{64}$, or nearly 98½ per cent., of its 1 inch stretch, remaining permanently overstrained to the extent of $\frac{1}{4}$ inch, it would be more elastic than the material which stretched 1 yard, and after removal of stretching force discharged $\frac{35}{36}$, or 97½ per cent., of its 1 yard stretch, remaining permanently overstrained to the extent of 1 inch.

An injury has been wrought on a man when his strength of mind and body has been *permanently* reduced. But if some temporary stress of mind and body produce only a temporary strain, leaving them quite as alert as before, uncrippled and undimmed, that stress were a proper stress, not in excess of the man's strength, doing it no injury, but really benefiting and developing, by exercising it. In this respect

what is true of human beings is equally true of building materials.

You will not have failed to observe that the factors of safety which are adopted in ordinary structural practice are, as I have already pointed out, in terms of the breaking strength.

This, the common practice of our day, though an improvement on earlier and ruder methods, is sure to be eventually superseded by a more scientific mode of estimation: for it is the limit of *elastic strength* rather than the limit of *breaking strength* which should form the basis of our calculations.

The limit of a man's proper exercise of his strength is not at the end of his life, but at the beginning of his death.

Death begins where the permanent loss of elasticity begins.

We need to distinguish permanent from apparent loss of elasticity: for what seems like a permanent overstrain will sometimes disappear, and the material, after a period of complete rest, will be found to have regained its original unstretched length; or if it be a case of distortion, such as the bending of a beam due to overloading, though on removal of the load the distortion or deflection may not at once wholly disappear, it does in some cases some time later, after a period of rest and recuperation, quite disappear; so that we might almost go so far in our analogy as to speak of an ailing beam, after a long rest, becoming convalescent!

Shakespeare was probably not thinking even of oak beams, and certainly not of steel girders, when he wrote, "One touch of nature makes the whole world kin." Yet the fact remains that the steel girder or tie rod may rightly claim kinship with even the most lordly architect who treats them carelessly, with ignorant semi-contempt as beneath his notice!

What is sorely needed by architects is what cannot at present be got either for love or money, viz. a true table, not only showing in one column the breaking stress of a rod of, say, 1 inch sectional area of each kind of material used in buildings, but also showing in another column the lower limit of elasticity of that material under given conditions. That is to say, the first-named column (which is what we have in text-books already) would state for each material the point where death is finished (*i.e.* breaking point), and the second column would show the point where death begins (*i.e.* the lower limit of elasticity).

Much information regarding the elastic limits of steel and iron has been already gathered by engineers, which architects for the most part have not been keen enough to avail themselves of. Our new technical colleges, which are rapidly rising in number and importance, and most of which are being equipped in their physical laboratories with splendid testing-machines, will become more and

more centres of light and leading on this subject of the elastic strength of materials, and young architects should take care to keep themselves up to date with these very important developments of structural science.

A professional trainer of athletes will, I believe, tell you that men in training do not all show signs of exhaustion long before they break down. Some give way quite suddenly. Men are very differently constituted from one another in that respect. And so it is true of materials, that some reach their lower limit of elastic strength at a point much nearer to breaking point than others do. And not only do different kinds of material show such differences, but even the same kinds of material under varying circumstances show considerable variations as to the ratio of their elastic to their breaking strength.

Not only in regard to adopting breaking stress as the basis for strength calculations is existing practice open to question, but also in regard to the common method of calculating strength as though it were simply proportional to sectional area.

An architect will say, for example, "Here is a round steel bar of 1 inch sectional area which will break at 30 tons pull, and here is another round steel bar of same quality, but of 4 inches sectional area, which will break with a pull of $4 \times 30 = 120$ tons, of course." But he is mistaken. The 4 inch bar would not prove equal to a breaking tension of 120 tons. Following the same theory (that strength varies as sectional area), the architect may further say, "Here is this 1 inch bar, and here is a wire of $\frac{1}{100}$ inch sectional area, both of the same steel. As the bar breaks at 30 tons pull, the wire will break at $\frac{1}{10}$ ton pull." But, again, the theory leads him astray: for in point of fact the wire will stand $\frac{1}{10}$ ton pull at least.

It is easy to believe that the process of wire-drawing may have a strengthening effect on the material by consolidating it more densely. But that this effect alone would account for 100 per cent. gain of strength is unbelievable. The truth is, there is a principle at work which as yet the textbooks have failed to recognise—the exceedingly potent principle of TRANSVERSE LEVERAGE.

The tendency of tension acting lengthwise through a bar is to make its length infinite, and its sectional area zero.

Conversely, compression tends to make the bar's sectional area infinite and its length zero.

Tension can produce no elongation except by reducing transverse dimensions; and compression can produce no shortening of length except by extending transverse dimensions.

The more closely the material of the bar is gathered about the longitudinal axis (as in a wire, for example), the less will it stretch under tension. On the other hand, the further the material is grouped from and about its longitudinal axis the

less will it shorten under compression (as in a hollow metal column, for example). Therefore a thin tube is unsuitable to withstand tension, as a solid tie-rod of equal weight to that of the tube has a much higher tensile resistance. Conversely, likewise, a solid pillar of metal is unsuitable to sustain compression endwise, as a hollow pillar of the same weight of metal offers a much higher compressional resistance.

When a bar or wire is elongating under tension its outer "skins," so to speak, stretch faster than its inner core. Let us, for convenience of illustration, conceive of a wire as having three "skins" and one core. The homogeneousness of the real wire will not upset the reasoning which takes these "skins" as a basis merely for showing how the transverse leverage operates on the substance of the wire at various distances from the core. On

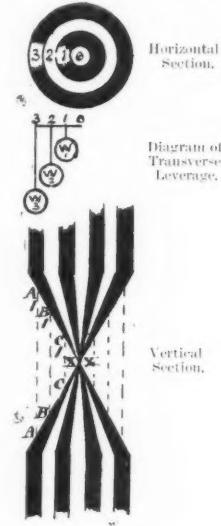


FIG. 2.

this sectional diagram I have sketched the core as white, the first "skin" black, the second "skin" white, and the third "skin" black. Let the upper end of this wire be attached to a stationary support, and the lower end be loaded with a weight exerting equal intensity of downward pull on each unit of the wire's sectional area. Let this weight be sufficient to break the wire, the point of final rupture occurring at the level $\times \cdots \times$. Now please note how the transverse leverage affects the forces which break the wire after stretching it to the rupture point.

Let W_1 , W_2 , and W_3 represent the equal units of breaking-weight pulling respectively on "skins" 1, 2, and 3. The transverse leverage with which these units of weight act reckons from the axis of the core to the middle of each "skin"

respectively. Thus W_3 and W_2 respectively have three times and twice the leverage possessed by W_1 . Therefore "skin" 3 is stretched with three times the force, and "skin" 2 is stretched with twice the force that is stretching "skin" 1. The extent of each "skin's" stretch is governed by the amount of force causing it; so, as the sketch shows, No. 3, which normally extended directly from A to A_1 , is stretched so as to extend from A to point, and onward to A_1 ; while No. 2, which normally extended directly from B to B_1 , is stretched so as to extend from B to point, and onwards to B_1 ; and likewise No. 1, which normally extended from C to C_1 direct, is so stretched as to extend from C to point, and onwards to C_1 .

The phenomenon of reversed cones begins to become permanently evident after the lower limit of elasticity is passed.

If the density and strength of wire were uniform throughout the sectional area, the fracture would occur at the point of two cones meeting, as the diagram [fig. 2] shows.

But, as the strength in a wire is never uniform throughout its sectional area, the conoidal phenomena, of stretching beyond elastic limit and breaking, do not, in point of fact, present *straight*, but more or less *curved*, outlines. The analysis of their curvature is very interesting, as showing the combined influence of varying leverage and varying tenacity; but those and other fascinating details involved cannot now be gone into, as time forbids.

There is still one other observation to add in this connection, viz. the fact that, when the breaking weight suspended at the lower end of the wire is free to do so, it revolves as it descends, corkscrew fashion, and thus *unwinds*, as it were, the strength of the wire, while reducing it slowly to the point of fracture; and if you closely observe sagging beams you may detect a disposition on their part to revolve transversely about their neutral axis in the act of bending; but of course the resistance of the wall-bearings absolutely forbids twisting of the beam at its bearings, and it is therefore only at mid-span (where that resistance is less absolute) that a keen observer can detect the tendency of the beam flanges to twist transversely out of level.

A very interesting, though somewhat singular, old gentleman once stopped me abruptly in Fawcett Street, Sunderland, saying in his own oddly sententious way, "Mr. Caws, tell me this, sir. I load a wire of one-quarter inch diameter with a weight which it cannot sustain at a stationary level; so this weight stretches and stretches the wire, all the time drawing it thinner and thinner, till the wire becomes only one-eighth of an inch in diameter, and then the weight comes to rest in mid air. Now, sir, tell me; how does it come about that the eighth-inch diameter wire holds stationarily suspended a weight which

the quarter-inch diameter wire could not likewise hold?"

The answer to the old gentleman's poser is that when the wire diameter began to permanently diminish from the quarter-inch it was at its lower limit of elasticity, and all the time it continued diminishing towards its one-eighth inch diameter it was stretching at the expense of its reserve of elastic strength. And when it reached the eighth-inch diameter it reached the upper limit of its elasticity, and would not have stopped contracting its diameter at that stage had not the act of wire-drawing somewhat consolidated its core. But even with this consolidation, at the eighth-inch diameter it was nearer the point of rupture than at the quarter-inch diameter.

This phenomenon is not without its close parallel in human life, as many an overworked architect, by sudden death in the midst of his heaviest labours, has afforded melancholy example.

The man who is working beyond his elastic limit and at high tension, though at first very conscious of the strain, sometimes gets inured, to a certain degree, and perhaps flatters himself that he is none the worse for his extraordinary efforts. But all the same he is nearer the breaking point; and if he is wise he will, at the earliest possible moment, get out of the *reversed cones* state, and reapproach the normal as nearly as his already overstrained condition will allow.

I must now bring these observations to a close, though there is really no end to the analogy existing between the nature of the architect himself and that of the materials which he employs.

I hope I have made plain that we ought to work by the elastic strength (when we know it) rather than by the breaking strength; and that we ought not blindly to calculate that the strength is simply proportional to sectional area, but bear in mind the effect of transverse leverage.

Before I close this lecture there is just one other point I desire to bring to your notice—a point affecting the question of *endurance*. To an architect Endurance is a paramount subject; for if there is one respect in which the products of his art emphatically excel those of all other arts it is in their attribute of permanence. Now I do not propose to trouble you with those very necessary precautions which every intelligent architect takes to protect his structures from the ravages of climatic changes, and from rot and decay due to damp, ill-ventilation, and a great number and variety of causes which there is no room in this lecture to even specify, much less to dwell upon. But I would point out, as plainly and briefly as I can, how the *mode* rather than the *amount* of work affects the endurance of materials subject to variations of stress which induce vibration.

All engineers now recognise one particular in which structural materials are peculiarly like human beings—viz. in their liability to *fatigue*.

Fatigue is most characteristic of structures subject to recurring and more or less irregular shocks and vibrations—such, for example, as railway bars and railway bridges. It may be thought on that account to lie rather outside the beat of an architect. But it is not possible in these days for an architect to succeed, even if so disposed, in shutting out from his mind half the facts, properties, and principles of his structural work. Lord Kelvin, a few years ago, in addressing an important audience, urged that all young architects should study, not only statics, but also dynamics. Surely Lord Kelvin was right; for do not our buildings, as well as our railways, vibrate—and especially those buildings which adjoin railways, or stand in the near neighbourhood of steam hammers and the like, to say nothing of those which surmount or adjoin the "Twopenny Tube" and other tunnels?

Moreover, our buildings are subject to the shocks of weights falling on or rolling, more or less irregularly, over their floors, and, still worse, to the heavy buffettings of tempests, which set up very severe dynamic stresses; so that we should indeed be foolish if we were to turn a deaf ear to dynamic science and insist that we have no occasion or call for it.

Sometimes a structure which has stood with apparent safety for a considerable period suddenly collapses, and a clear reason cannot always be found.

The Dee Bridge, of cast iron, was designed by Robert Stephenson, the most accomplished railway engineer of his day. After sustaining the traffic some considerable time, that bridge disastrously collapsed when a train was crossing it; and the loss of life, as well as of property, which ensued led to a Board of Trade inquiry of a most stringent character. Stephenson produced his plans, and showed that his calculations for the scantlings of the main girders, which broke down, afforded, according to the known breaking strength of the material, a considerable factor of safety; and the only rational cause he could suggest for the disaster was that the train must have got off the line. Yet I believe no positive evidence was forthcoming that the train jumped the rails. It was Stephenson's suggestion or surmise—that was all; and no one ever certainly knew the cause of that disaster, which remains, like many another structural collapse, a mystery.

I now wish to demonstrate how such mysteries may—in some cases at least—be reasonably explained.

One very ordinary and commonly recurring accident, with which many people are familiar, is the breaking of some spring of a gig or dog-cart. Almost invariably when this happens the broken ends of the spring are examined, and the metal is found to be crystallised at the fracture. Then very frequently the suggestion is most mis-

takenly entertained that some flaw in the spring had been originally present at the point of fracture, and that the crystallisation was a proof of such flaw. Yet really and truly in most such cases there was not an original flaw, and the crystallisation was caused by no such flaw, but by the natural law of elasticity in relation to the vibrational periods of that spring.

As you are all well aware, every pendulum according to its length has a natural period of vibration: and likewise every body in Nature capable of contraction and extension under stress has a natural period of vibration.



FIG. 3.

Here is a helical steel spring, made by Salter of West Bromwich. When it is lying down horizontally on the table, so that it has not even its own weight to carry, its normal length is * X: but when suspended as you now see, loaded by W and also by its own weight, its length is * O. There it hangs motionless. We measure its static stretch, X O, and make a pendulum P of equal length suspended from O.

I place my hand under the W and gently raise it so as to relieve the spring of some of its tension. I now withdraw from beneath W the support of my hand, and, as you see, the W, with the spring, vibrates vertically with a proper rhythmic motion. Now I set this pendulum P gently beating, and I ask you to observe the fact that the pendulum and the spring are beating at equal periods; because the length of the pendulum equals the static stretch of the spring.

Here is subject-matter for many lectures. But I must not dwell on it further than to let this simple experiment show the vital connection existing between vibrational period due to the elasticity of the material and the endurance of that material under stress.

I have had this spring many years. I value it highly. It has served me in many important experiments. I am well acquainted with its elastic strength. I do not know its breaking strength. I can put 16 lbs. on it without overstraining it. But 16 lbs. is its lower elastic limit. In all my dealings with this spring I am very careful never to load it quite up to that limit. In fact, regarding

this particular spring, possessing definite knowledge as I do of its elastic lower limit, I deal with the spring as I have urged upon you to-night the architect should deal with the materials in his structures, if only he could get to know what their lower elastic limit is in each case.

Well, now, say I put on my spring $10\frac{2}{3}$ lbs., i.e. two-thirds the 16 lbs. of proper elastic strength. Surely I am safe in doing that? Am I safe? Is it possible the spring can suffer when only loaded to that extent? Yes, it is possible. Nay, if there were only $5\frac{1}{3}$ lbs. load, that spring could be overstrained and spoilt: if its natural period of vibration were forced to give way to a quicker period.

We have already seen how the natural period is governed by the measure of static stretch, so that the period, of course, is varied by variations of load, a light load involving a shorter period than a heavier load.

I do not say that if on one or two occasions only I forced the spring under a light load to oscillate faster than its nature prompted, I should perceptibly degrade the elastic strength of the spring. But if I continued the forcing of the pace (as it is continued in the case of many a dog-cart spring and many a railway viaduct) disintegration and crystallisation would gradually accrue, till in course of time the spring would be found to have sustained a permanent loss of its elastic strength, refusing, when laid flat on the table and relieved of all stress, to return to its normal shortness * X, and plainly revealing a permanent elongation, which proves irrecoverable loss of elasticity to that extent. If, ignorant of this danger, and imagining the spring was all right because loaded far short of its elastic lower limit, I continued forcing the pace of vibration, the mischief would accumulate, fatigue would develop, and one day the spring would surprise me, like a dog-cart spring or a Dee Bridge, or like the collapse of a young man's constitution ruined by repeated excesses, snapping without warning.

Do not for one moment allow yourselves to think that these things may be true of my steel

spring, but are not necessarily true of vibrating buildings and their parts and members. To these general principles to which I have pointed all materials and all Nature are pledged by the eternal constitution of dynamic law and order, and no exceptions can be made. Even the ocean waves in their wildest ragings obey this law of periodic vibration; and if the hurricane will force their pace beyond what is natural, it can only succeed in tearing the water to pieces, destroying its cohesion, and lashing the wave crests into foam, which is equivalent to the crystallisation of the cart spring accompanying its fracture.

In attempting thus in one lecture to invite your attention to some principles common to all building materials, I have feared to hurry your minds beyond their proper natural rate of reception of new ideas, and have therefore abstained from cramming in a mass of details which might have distracted your attention from the main issues, and thus served only to tear, as it were, the homogeneity of our subject to shreds and tatters.

I have sought to point out a direction in which there is room for such an advance of constructive science as architects should be not among the last of Sadducees to grudgingly recognise, but among the first of Pioneers to explore, open up, and bring to the knowledge of mankind.

[Several of the students put questions to the lecturer which showed how keenly they had followed every point of the subject: and in supporting the vote of thanks, which was warmly accorded, Mr. A. B. Plummer [F.] spoke of the necessity of providing in structures a generous surplus of strength, to meet such unforeseen stresses as thoughtless contractors sometimes put temporarily upon unfinished buildings; as, for instance, a case in his own experience, where a heavy crane had been placed upon light joists and walls in which the mortar was not hard-set; so that, if he had not himself discovered the thing in time, this unfair and unforeseen temporary stress would have resulted in bulging the walls, and doing irremediable mischief.]



9, CONDUIT STREET, LONDON, W., 9th Feb. 1901.

CHRONICLE.

Death of Her late Majesty Queen Victoria.

A wreath of laurel, arum lilies, and orchids was sent to Windsor, with the following inscription in silver on black ribbons:—"From the Royal Institute of British Architects. In Grateful and Loyal Memory of Her late Most Gracious Majesty Queen Victoria, Patron of the Royal Institute."

The following telegram from the Société Centrale des Architectes français, Paris, came too late for publication in the last issue of the JOURNAL:—"To W. Emerson, 9, Conduit Street, Hanover Square, London, W.—Les membres de la Société Centrale des Architectes français réunis en assemblée générale adressent à l'Institut Royal des Architectes britanniques l'expression de leur profonde sympathie à l'occasion du deuil national causé par la mort de sa très gracieuse Majesté la Reine Victoria, sa souveraine bien aimée, patronne de l'Institut.—Le Président C. Moyaux."

Many similar expressions of sympathy have been received from Corresponding Members abroad.

Address of Condolence to His Majesty the King.

A notice was issued to London members and to the Presidents of Allied Societies announcing that at the General Meeting on the 25th February the President would move from the Chair an Address of Condolence to His Majesty on the death of her late lamented Majesty Queen Victoria. The Council, however, at their Meeting on the 4th inst., considering that so long a delay in presenting the Address was inadvisable, have determined to forward it to the Secretary of State of the Home Department as soon as possible. The Address presented by the President and Council "on behalf of the Members of the Royal Institute of British Architects and of the Societies both in the British Islands and the Colonies in alliance therewith," will be read at the General Meeting on the 18th inst.

The R.I.B.A. Prize Competitions.

The Annual Exhibition of Designs and Drawings submitted for the Prizes and Studentships

in the gift of the Royal Institute was held at the Gallery of the Alpine Club, Savile Row, from Tuesday the 15th to Saturday the 26th ult. The number of designs and drawings sent in was considerably in excess of any previous year, hanging space having to be found for over 430 strainers. In the Institute Meeting-room were shown the works done during their respective tours by Mr. John Stewart (*Owen Jones Student* 1899), Mr. James McLachlan (*Pugin Student* 1900), and Mr. Percy Erskine Nobbs (*Tite Prismen* 1900). The Council's Deed of Award is printed in the last number of the JOURNAL, p. 129.

Prize Drawings for Exhibition at Allied Centres.

The following selection from the Prize Drawings and from Testimonies of Study submitted by candidates successful in last year's Examinations will be sent for exhibition at the Allied Societies throughout the United Kingdom:—

The Royal Institute Silver Medal (Measured Drawings).—Kirby Hall, Northants (2 strainers), by Mr. Lawrence L. Bright (under motto "Stafford Knot"), awarded the Medal and Ten Guineas.—St. John's Church, Westminster (1 strainer), by Mr. A. Wyatt Papworth (under motto "Archer," and Burghley House, near Stamford (1 strainer), by Mr. H. F. Keighley (device, "Cannon"), awarded Medals of Merit and Five Guineas.

The Soane Medallion.—Designs for a Club House—2 strainers by Mr. M. J. Dawson (under motto "Ars"), 2 strainers by Mr. H. M. Cautley (under motto "Hiawatha"), and 2 strainers by Mr. J. B. Fulton (under motto "Ionic"), awarded prizes of Thirty Guineas each.

The Owen-Jones Studentship.—Drawings by Mr. Hervey Rutherford (2 strainers), awarded the Certificate and £100. Drawings by Mr. Percy E. Nobbs (1 strainer) and Mr. Ramsay Traquair (1 strainer), awarded Medals of Merit. Drawings by Mr. E. Bennett (1 strainer), awarded Certificate of Honourable Mention.

The Pugin Studentship.—Drawings by Mr. Henry W. Cotman (2 strainers), awarded the Medal and £40. Drawings by Mr. J. Forbes Smith (1 strainer), awarded Medal of Merit. Drawings by Mr. A. J. Pitcher (1 strainer), awarded Certificate of Honourable Mention.

The Tite Prize.—Designs for an Entrance Gateway to a Public Park—2 strainers by Mr. W. Fairbairn (under motto "Corona"), awarded the Certificate and £30. 1 strainer by Mr. Ralph Knott (under motto "St. George"), awarded Prize of Ten Guineas. 1 strainer by Mr. W. A. Mellon (under motto "Marble Arch"), awarded Certificate of Honourable Mention.

The Grissell Medal.—Design for a Timber Footbridge (2 strainers), by Mr. Edwin Forbes (under motto "Pons Asinorum"), awarded the Medal and Ten Guineas.

Testimonies of Study (9 sheets).—Drawings

by Messrs. A. J. Hope and C. T. Palmer (*Intermediate Examination*).

Norwich Union Life Insurance Society : Limited Competition for Proposed New Offices.

A correspondence has taken place between the Council of the Institute, Messrs. Boardman & Son (*Fellows*), of Norwich, and the President and Secretary of the Norwich Union Life Office, with regard to the conditions of the above competition.

The conditions were in every way unsatisfactory, inasmuch as no premiums were offered, no guarantee given that any design would be accepted, no provision made for compensating competitors if the buildings were not erected, and no independent architect of standing appointed assessor. The assessors were a firm of surveyors, the "regular professional advisers of the Board in such matters."

Messrs. Boardman & Son very properly declined an invitation to compete, on the ground that the conditions were not in accordance with the principles laid down by the Royal Institute in the "Suggestions."

In response to the Council's representations, we regret to say that the Norwich Union Life Insurance Society neither admitted the right of the Royal Institute to address them on behalf of the Profession with regard to their competition, nor could be brought to see any reason for modifying their amazing conditions.

Glasgow Royal Infirmary Competition.

In the matter of the above competition, Mr. C. J. MacLean, Secretary of the Glasgow Institute of Architects, by instruction of his Council, forwards the Institute a copy of a letter addressed to the Chairman and Managers of the Glasgow Royal Infirmary in the following terms :

115 St. Vincent Street, Glasgow, 21st January 1901.

GENTLEMEN,—Recognising it to be your earnest desire that the Infirmary, when reconstructed, should conform to the most modern standards of design in this class of building, and that the subscribers and the general public have a right to expect this, we, the Glasgow Institute of Architects, as a body of technical experts in such matters, feel it to be our duty to state that, in our opinion, this result will not be achieved if the reconstruction is proceeded with according to the plans selected by your sub-committee in the recent competition.

We attribute this failure not to any lack of zeal on the part of your committee, or of ability on the part of the competing architects, but mainly to the manner in which the competition was initiated and carried through, and that in the following respects among others :—

I. That along with the printed conditions provided for the competition there were issued two

sets of sketch plans as indicative of alternative arrangements which the sub-committee recommended, and which were stated in the accompanying report to be drawn by or under the direction of two members of the sub-committee respectively.

II. That a Jubilee Block to be situated on a particular part of the site was insisted upon as an integral part of the scheme.

The results of these elements in the conditions were :—

(a) That the competitors and the Assessor were hampered in the exercise of their individual judgment as to the main points of importance in such a building, viz.:—the distribution of the various buildings with respect to each other for convenience of working, and of all for the freest access of sun and air.

(b) That the competitors were placed in the invidious position that, in the event of the schemes recommended by the Committee not proving themselves to be in accord with their judgment and experience, they were bound, in departing from them, to meet with disfavour from those influential members of the Committee who would enter upon the examination of all the plans with minds necessarily biased in favour of those which they themselves had put forward, while reserving their position as judges.

(c) That as the result, the proposal that plan E be accepted, which became the finding of the meeting, was moved by the gentleman who was actually the author of the scheme which was adopted and worked out in detail by this competitor.

III. That neither of the sketch plans issued are in accord with the present-day principles of hospital design, as might indeed be expected, seeing that their authors have not enjoyed the training which would qualify them as surgical, medical, or architectural experts; that, in fact, the plans are in many vital particulars inadequate and out-of-date, and that these faults are naturally displayed equally in the selected design, which is but an elaboration of one of them. A corroboration of this assertion with regard to the radical faultiness of the plans in question is furnished by the fact that six out of the ten competing architects found it necessary, in spite of risk of possible consequences already alluded to, to entirely throw over the schemes furnished to them, and that among this number are found all the four architects from outside of Glasgow (two from London and two from Edinburgh), who were presumably invited specially on account of their knowledge of hospital design.

Such being the opinion of the Institute after a very mature and careful consideration of the

whole subject, we would most earnestly urge the managers, before committing themselves and the public to the erection of any portion of the building, as designed, to have the plans submitted to one or more independent hospital authorities of recognised and outstanding position, for consideration and report.

Apart from the all-important question of the erection with the public funds of an entirely adequate and modern hospital, we, the Institute of Architects, feel it necessary to lodge a protest against the setting aside by the sub-committee, without any reason given, of the award of the professional Assessor, Dr. Rowand Anderson—the more so that a simple majority of one was considered sufficient to overturn his judgment—as liable to prejudice the success, alike for promoters and architects, of future competitions in Glasgow. And we have further to state that the erection of a Jubilee Block, such as is proposed, seven stories high, and in the position selected, will, if proceeded with, dwarf and irretrievably injure for all time the external appearance of the Cathedral. The foregoing statements represent the unanimous finding of the Glasgow Institute of Architects, at a meeting specially called to consider a report of the Council on the question, and as the matter is not only one of the greatest public importance, but of extreme urgency, owing to the proposal of your sub-committee to proceed at once with the erection of the northern block, it has been communicated to the public press at the same time as it is submitted, with our earnest prayer for its consideration, to yourselves.

In name and on behalf of the Glasgow Institute of Architects,
C. J. MACLEAN, Secretary.

The Administration of the Public Health Acts.

The following letter has been addressed to the Town Clerk of the City of London, the Clerk of the London County Council, and the Town Clerks of the new Metropolitan Boroughs:—

29th January 1901.

SIR,—The Council of the Royal Institute of British Architects having had their attention directed to the administration of the various Acts of Parliament in relation to the construction, reconstruction, amendment, and repairs of drains and sanitary appliances, and the structural removal of nuisances in connection therewith, beg leave to put forward for your consideration the following modifications which it would be desirable to have made in the administration of these various Acts:—

- (1) That the detection only of nuisances arising from sanitary apparatus or drains shall remain in the department of the Medical Officer to the authority.
- (2) That matters relating to the construction,

reconstruction, amendment, and repairs of drains and sanitary appliances, and the structural removal of nuisances in connection therewith, be placed in the department of the Surveyor to the authority.

The Council of the Royal Institute would most respectfully urge that such measures be taken as are necessary to give effect to these suggested modifications, which can be effected without recourse to legislation, as the Public Health Act places the administrative power with the local authority, and not with any officer of the authority; and the Council thinks that the creation of the Metropolitan Borough Councils presents a favourable opportunity for carrying out the above suggestions.—I am, Sir, your obedient servant,

(Signed) W. J. LOCKE, Secretary.

Registration of Plumbers.

On the 23rd ult. a deputation of members of the Parliamentary Committee of the Irish Trades Congress waited upon the Right Honourable George Wyndham, Chief Secretary for Ireland, in Dublin, to urge his support of the aims of the Congress, including the Registration of Plumbers under statutory powers. In the course of a sympathetic reply, Mr. Wyndham expressed his sense of the importance of plumbers' work, and his opinion that a number of deaths and a great deal of disease were attributable to defective sanitation and to bad work by incompetent plumbers.

Carpenters' Hall Lectures, 1901.

The annual lectures on matters connected with building delivered under the auspices of the Worshipful Company of Carpenters have been arranged this year as follows:—

February 21.—Mr. H. Heathcote Statham [F.] on "Architecture at the Paris Exhibition."

February 28.—Mr. H. C. Richards, K.C., M.P., on "Old London."

March 7.—Mr. John Slater, B.A.Lond. [F.], on "Celebrated Ancient Buildings."

March 14.—Mr. W. E. Riley [F.], on "Dwellings for the Working Classes."

March 21.—Prof. T. Roger Smith [F.], on "Westminster Abbey."

The lectures will be illustrated by lantern photographs. Admission is free, by ticket to be obtained from the Clerk to the Company, Carpenters' Hall, London Wall.

Obituary.—We regret to announce the death, on the 31st ult., of Mr. John Murray Robertson, of Dundee, *Fellow*, elected 1888.

REVIEWS.

CHARTRES AND ROUEN.

"Bell's Handbooks to Continental Churches," 8s. *Lond.* 1900. Price 2s. each. [Messrs. George Bell & Sons, Covent Garden, London, W.C.]

The City of Chartres: its Cathedral and Churches.
By H. J. L. J. Massé, M.A.
The Churches of Rouen. By Rev. Thomas Perkins.

The success of the volumes of the "English Cathedral" series, nearly all of which have reached a second edition, has emboldened Messrs. Bell to deal with the French cathedrals in a parallel series. M. Massé has gained experience in his volumes on Gloucester and Tewkesbury, and his description of Chartres is careful and on the whole accurate. Visitors to Chartres, however, will do better to purchase the little "Guide Chartrain," which is on sale in the cathedral, and which has much facilitated M. Massé's task. The French guide is much fuller and much more definite and exact—*e.g.* it gives two whole pages to a table of the dimensions of the cathedral; M. Massé gives but one. The difference of grip is well seen in the account of the early work in the crypt. M. Massé says loosely "there are still the evidences of the fourth-century Gallo-Roman work." The French guide has "Le caveau est contigu à une muraille, dont le petit appareil et les bandes horizontales de briques parfaitement conservées accusent le IV^e siècle." Nor does the author inspire confidence when he writes: "Five massive piers on either side of the nave support the *thrust* of the vaulting of the roof, which is *borne* by the flying buttresses." Again, he says that "the chief architectural features in the chapels under the western towers are the capitals of the piers." He seems not to know that the vaults of these towers are placed by the French archaeologists among the very earliest in France, ranking with those in a similar position at Lisieux, Marseilles, Moissac, and St. Gaudens. The width of the nave is given on page 120 as 45½ feet; on page 59, more correctly, as 58½ feet—the widest in France with aisles. The relative lowness of the vault, and the excessive massiveness of walls, piers, buttresses, and flying buttresses, might well have been correlated with this excessive width of nave, which is itself conditioned by the dimensions of the ancient crypt whose lines it follows. There are three plans and numerous photographs, the latter not very well reproduced.

The volume on Rouen has been entrusted to the Rev. Thos. Perkins, who has already dealt with Wimborne and Christchurch, and who has written a Handbook to Gothic Architecture for the benefit of photographers. As was to be expected from Mr. Perkins's reputation as a photographer, the illustrations are far above the average. Where so many are excellent, it is difficult to particularise;

but those of the Portail des Marmosets, the flying buttresses of the choir, and the glazed triforium of St. Ouen are especially admirable. There are plans of the cathedral and of St. Ouen; it is regrettable that the vaulting is not shown as it is in the Chartres plan. Nor is any scale attached to the Chartres and Rouen plans. The plan of Rouen Cathedral is strangely English in look: it takes us off straight away to Norwich, Bury, and Ely. Like Bury, it has a western transept, with flanking towers; like Ely, a double-aisled transept, but with eastern apses as well. Like Norwich, it has an apsidal choir, ambulatory, and radiating chapels. Mr. Perkins has done his work exceedingly well, and there is a freshness and independence about his criticisms of design which, whether we agree with him or not, make the book eminently readable; it is by no means a dull, dry-as-dust compilation. His remarks on the excessive verticality of the St. Ouen interior are excellent, and his defence of the iron spire is as sensible as it is amusing:

Much has been said, and justly said, against this addition to the central tower, but seen from a distance it seems to pull together the composition of the pile; and as architectural purists are always finding fault with architects for making slavish copies of ancient work, and bidding them to put up frankly modern work in any additions that they make, there are some who will not feel inclined to join to the full in the chorus of abuse which has been lavished on Alavoine's work. The nineteenth century may be well regarded as an iron age. The iron spire of Rouen, therefore, marks an epoch; it is characteristic of the time of its erection, and cannot possibly be mistaken for sixteenth-century work.

As in the Chartres volume, the other churches of the town are treated at some length, especially St. Maclou.

FRANCIS BOND.

RENAISSANCE ARCHITECTURE IN ENGLAND.

A Short History of Renaissance Architecture in England, 1500-1800. By Reginald Blomfield, M.A., Oxon., Architect, Author of "The Formal Garden in England," &c. With drawings by the Author, and other Illustrations. Price 7s. 6d. [Messrs. George Bell & Sons, York Street, Covent Garden.]

Mr. Blomfield's abridgment of his *History of Renaissance Architecture in England* contains practically the same amount of information as his larger book, put in much the same attractive manner. The history is in every way complete, typical examples being retained both in illustration and letterpress, the abridgment consisting mainly in the abbreviation of sentences, rather than in the omission of facts, and a plate of Palladio's orders is added on account of the important part they played in English Architecture subsequent to the time that Inigo Jones studied them in Italy. Students of the style, for whom this volume

has been prepared, have now a concise history, tracing its course from the earliest periods when the Renaissance here was exemplified in the labours of a small number of foreign workmen, and then in the tentative efforts of the Early English builder-architects—periods all the more interesting because little known or understood—on through the times of Inigo Jones and Wren, dealing then with their immediate successors and the following school of amateurs, to the time of the Dances and the brothers Adam. The student who has assimilated all that is set out here under the above divisions, assisted by chapters on house-planning and the various handicrafts, must have a good knowledge of the gradual development of the style, its period of greatness, decline and fall.

The illustrations stand the reduction well, some even being improved, the values of the darker parts telling with more effect. At a time like the present, when the English Renaissance is so much studied, this book will be very valuable to the student as a ground on which to base his own observations, as well as any detailed information obtainable on isolated subjects.

H. TANNER, jun.

LEGAL.

London Building Act: "Public Building."

In *Moses v. Marsland*, heard on January 17th by Mr. Justice Bruce and Mr. Justice Phillimore, a question was raised as to the meaning of the words "public building" in section 5, subsection 27, and sections 68 and 79 of the London Building Act, 1894. The question arose on a special case stated by a metropolitan police magistrate to review his ruling on an appeal against the objections of a district surveyor under section 150 of the Act.* The Metropolitan Asylums District managers have, under a Local Government Board order of April 2nd, 1897, the care of children who, from defect of intellect or physical infirmity, cannot be trained in ordinary schools. The managers framed a scheme for the purchase of dwelling-houses in which to lodge these children, and under the scheme acquired No. 16, Elm Grove, Camberwell. Plans were made for alterations in the house for the purposes of the scheme, the effect of which was to provide for a building with a cubical capacity of 50,000 feet. The plans were in the first instance submitted to the district surveyor as plans of a public building within sections 68 and 79. But when controversy arose on the requirements of the district surveyor, the managers contended that the building was not "public," and no attempt was made to argue that they were by the application estopped from raising this contention. The magistrate held that the building was, in the hands of the managers of the Metropolitan Asylums District, used, or constructed, or adapted to be used for a public purpose, and made the order asked for by the respondent. Section 5 (27) of the London Building Act provides that in that Act "the expression 'public build-

ing' means a building used, or constructed, or adapted to be used as a church, chapel, or other place of public worship, or as a school, college, or place of instruction (not being merely a dwelling-house so used), or as a hospital, workhouse, public theatre, public hall, public concert-room, public ball-room, public lecture-room, public library, or public exhibition-room, or as a public place of assembly, or used, or constructed, or adapted to be used for any other public purpose, also a building used, or constructed, or adapted to be used as an hotel, lodging-house, home, refuge, or shelter, where such building extends to more than 250,000 cubic feet, or has sleeping accommodation for more than 100 persons."

Mr. Macmorran, Q.C. (Mr. Herbert Smith with him), for the appellant, cited *Joselyne v. Meeson* (53 Law Times, 319). Mr. R. C. Glen, for the respondent, contended that the building was *eiusdem generis* with a hospital, and therefore within the term a "building used, &c., for any other public purpose."

The Court allowed the appeal.

Mr. Justice Bruce said that he was of opinion that the building in question was not a public building within section 5 (27) of the London Building Act 1894. He did not agree with Mr. Glen's contention that the building was a hospital. No doubt the word hospital originally had a very wide meaning and meant any place of lodging; but in modern times it was used to signify a place for the treatment of the sick or infirm. The building in question could not be considered as a hospital in that sense. Nor was the building within the section on the ground that it was a building used for "any other public purpose." The substance of the decision in *Joselyne v. Meeson* was that the phrase "public purpose" indicated, not a place in which the public had an interest, but one where they could gain admission. Apart from that, a building used "for any other public purpose" must be one used for a purpose *eiusdem generis* with those of the enumerated buildings, and would not include a house used for the purpose described in the case. The building did not come within the term "home" because it had not a cubical capacity of 250,000 cubic feet or sleeping accommodation for 100 persons. The magistrate, therefore, came to a wrong conclusion, and the appeal must be allowed.

Mr. Justice Phillimore said that in his opinion the building was not a hospital in the modern sense of a place for treating physical ailments. The Local Government Board and the Metropolitan Asylums Board had anticipated the provision of the Elementary Education (Defective and Epileptic Children) Act 1899, and had provided houses for the reception of children who were incapable of being associated for the purposes of education with ordinary children, as an adjunct to schools where special arrangements were made for the education of such children. The children placed in these houses were there for the purposes of education, and not for treatment. The houses were, therefore, in no sense hospitals. He was also of opinion that the building did not come within the words "building used, &c., for any other public purpose." These were not perhaps the best words to have used. But they were the words which were used in the former Act dealing with the subject, and as they had received judicial interpretation in *Joselyne v. Meeson* they were introduced into the Act under consideration. The words did not include every building used in the public interest, but only buildings used for purposes which involved the admission of the public, as, for instance, a public lecture-hall, where every member of the public who paid the entrance money was admitted. He was therefore of opinion that the building in question did not fall within the terms of the section, and that the magistrate's decision was wrong.

* See report of the hearing before the magistrate, JOURNAL R.I.B.A. Vol. VII. (1900), p. 480.

